Impact of floods induced by extreme precipitation events on public health

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Hydrometeorological disasters comprise the most reported type of natural disaster, and floods account for the majority of disasters in this category in both developed and developing countries. Flooding can lead to extensive morbidity and mortality and pose multiple risks to public health throughout the world.

This study involved an extensive and systematic literature review of 124 research publications related to public health impact of 98 floods that occurred globally (Oceania 4, Africa 9, America 22, Europe 24, Asia 39) from 1942 to 2014. The inclusion criteria were literature type comprising journal articles and official reports, natural disaster type including floods induced after extreme precipitation events (accumulation of rainwater in poorly-drained environments, riverine and flash floods), population type including humans, and outcome measure characterized by infectious diseases (ID) incidence increase.

The potential post-flood ID are classified into 13 groups including rodent-borne (reported in 38 of the total 98 events, 38.78%), water-borne (33, 33.67%), vector-borne (25, 25.51%), respiratory (19, 19.39%), fecal-oral (14, 14.29%), skin (9, 9.18%), blood-borne (4, 4.08%), eye (3, 3.06%), soil-related (3, 3.06%), ear (2, 2.04%), fungal (1, 1.02%) and wound-borne (1, 1.02%) ID. Based on available age and genre data, it is concluded that the most vulnerable population groups are predominantly young children (age $\leq$ 5 years) and male. The most fatal post-flood ID are leptospirosis and diarrhea followed by respiratory tract infections. The detected risk factors include (1) poor economic status and living in flood prone areas, (2) destruction of infrastructures, disruption of public utilities and interruption of basic public health services such as vector control programs, (3) direct physical exposure to sewage-polluted flood water, (4) lack of adequate potable water and water-supply from contaminated ponds and tube wells along with lack of distribution of water purification tablets, (5) aggravation of environmental conditions comprising rapid cooling of the environment and heightened humidity, (6) population displacement resulting in densely populated and overcrowded regions, (7) unfavorable living conditions in emergency shelters (8) improper and inadequate sanitation or no access to clean water and sanitation, (9) proliferation and abrupt increase of vector and rodent populations after flooding, (10) contamination of water, damp soil, mud or vegetation caused by rodent urine, dead animals and overflow of latrines.

In conclusion, various ID emerge after the flood onset, and outbreaks may result due to the combined effect of several aggravating socio-economic factors and unfavorable environmental conditions. Because of the increased potential for outbreaks after flooding disasters, enhanced public health services and surveillance systems are necessary for the early detection of emerging diseases and outbreaks, and the targeted intervention for disease control.